
**Road vehicles — Test methods
for electrical disturbances from
electrostatic discharge**

*Véhicules routiers — Méthodes d'essai des perturbations électriques
provenant de décharges électrostatiques*



This document is a preview generated by ELS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2023

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword.....	v
Introduction.....	vi
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Test conditions.....	2
5 Test location.....	3
6 Test apparatus and instrumentation.....	3
6.1 ESD generator.....	3
6.2 Discharge tips.....	3
6.2.1 Contact discharge tip.....	3
6.2.2 Air discharge tip.....	4
6.3 Discharge current specifications.....	5
6.3.1 Contact discharge mode current specifications.....	5
6.3.2 Air discharge mode current specifications.....	6
6.4 Ground plane.....	6
6.5 Field coupling plane.....	7
6.6 Insulating block.....	7
6.7 Dissipative mat.....	7
6.8 Uncertainty (informative).....	7
7 Discharge modes.....	7
7.1 General.....	7
7.2 Contact discharge mode.....	7
7.3 Air discharge mode.....	7
8 Component immunity test method (powered-up test).....	8
8.1 General.....	8
8.2 Test plan.....	8
8.3 Test procedure for direct discharges.....	8
8.3.1 General.....	8
8.3.2 Test set-up.....	8
8.3.3 Test method.....	11
8.4 Test procedure for indirect discharges.....	12
8.4.1 General.....	12
8.4.2 Test set-up.....	12
8.4.3 Test method.....	15
9 Component packaging and handling test method (unpowered test).....	16
9.1 General.....	16
9.2 Test plan.....	16
9.3 Test procedure.....	16
9.3.1 General.....	16
9.3.2 Test set-up.....	17
9.3.3 Test method.....	18
10 Vehicle test method.....	19
10.1 General.....	19
10.2 Test plan.....	19
10.3 Test procedure.....	19
10.3.1 General.....	19
10.3.2 Test set-up.....	19
10.3.3 Test method.....	21
11 Test report.....	21

Annex A (normative) Current target specification and verification of ESD generator	22
Annex B (informative) Standard target drawings and target verification method	26
Annex C (informative) Function performance status classification (FPSC)	38
Annex D (informative) Test method guidance — Generator resistor value and air or contact discharge	42
Annex E (informative) Rationale for air discharge generator verification	45
Annex F (informative) Description of field coupling fixture for direct and indirect discharge to powered-up DUT	47
Annex G (informative) Test method guidance - automatic operated ESD testing	49
Bibliography	52

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

This third edition cancels and replaces the second edition (ISO 10605:2008), which has been technically revised. It also incorporates the Amendment ISO 10605:2008/Amd 1 2014 and the Technical Corrigendum ISO 10605:2008/Cor 1:2010.

The main changes are as follows:

- introduction of alternative test set-up with field coupling plane for direct and indirect discharges on component (powered-up test);
- minimum number of discharges changed from 50 to 10 for indirect discharge on component (powered-up test);
- interval between successive single discharges changed from 50 ms to 1 s for indirect discharge on component (powered-up test);
- addition of a ground connection for discharges on DUT pins for component packaging and handling test method (unpowered test);
- optional test set-up and procedure for electronic modules (powered-up test) moved from Annex to main body;
- addition of new [Annex G](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The electrostatic discharge, due to former charge build-ups generated, for example, when moving about inside a vehicle or getting out of it, has assumed greater significance with the increase of vehicle electronic modules. Tests simulating the electrostatic discharge of humans, in common use by various industries, were examined and it was determined that they were not fully applicable to the automotive environment. As a consequence, tests tailored to the automotive environment were developed.

Tests that simulate an electrostatic discharge (ESD) into a vehicle electrical system are based on the human ESD model. Sensitive electrical devices can be adversely affected by energy either coupled or radiated from electrostatic discharges.

This document describes ESD tests that are applicable to both automotive electronic modules and vehicles.

Road vehicles — Test methods for electrical disturbances from electrostatic discharge

1 Scope

This document specifies the electrostatic discharge (ESD) test methods necessary to evaluate electronic modules intended for vehicle use. It applies to discharges in the following cases:

- ESD in assembly;
- ESD caused by service staff;
- ESD caused by occupants.

This document describes test procedures for evaluating both electronic modules on the bench and complete vehicles. This document applies to all types of road vehicles regardless of the propulsion system (e.g. spark-ignition engine, diesel engine, electric motor).

The test for electronic modules on the bench described in this document applies to any DUT (powered by an unshielded power system, DUT powered by a shielded power system, self-powered DUT, etc.).

This document does not apply to pyrotechnic modules.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11452-1, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11452-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

air discharge

test method characterized by bringing the test generator discharge tip close to the *device under test (DUT)* (3.3); the discharge is by arcing on the DUT

3.2

contact discharge

test method characterized by contact of the test generator discharge tip with the *device under test (DUT)* (3.3), where discharge is initiated by the generator discharge switch